

01686
S/869/62/000/000/010/012
B102/B186

21,1000

AUTHORS: Shikhov, S. B., Abagyan, L. P.

TITLE: Method for establishing the multi-group constants in the resonance range when the heterogeneous effects are taken into account

SOURCE: Teoriya i metody rascheta yadernykh reaktorov; sbornik statay. Ed. by G. I. Marchuk. Moscow. Gosatomizdat, 1962, 200 - 222

TEXT: A method is developed which makes it possible to calculate explicitly how the cross section, averaged over the lethargy interval of the group and over the lattice cell volume depends on the isotope composition in the lump and on the cell parameters. The lump effect throughout the whole range of well resolved ($\Gamma \ll D$) resonance levels of the heavy isotope is taken into account, as well as the lattice parameters and the Doppler effect. The averaging of the multi-group constants in the resonance range extending from the upper thermal limit E_c down to

~ 400 ev is discussed first. The cross section averaged over the lattice cell volume for the k-th group is

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$$\langle \Sigma_r \rangle_k = \frac{\int_V dV \int_{\Delta u_k} \Sigma_r(\vec{r}, u) \phi(\vec{r}, u) du}{\int_V dV \int_{\Delta u_k} \phi(\vec{r}, u) du} \quad (1),$$

where Δu_k is the lethargy interval of the group, $\phi(\vec{r}, u)$ the neutron flux per lethargy unit, $\Sigma_r(\vec{r}, u)$ the resonance capture cross section and ϕ_0 the neutron flux in the absence of resonance absorption. Expressed in terms of the effective resonance integral of the k-th group $I_{eff,k}^r$, (1) is written in the form

$$\langle \Sigma_r \rangle_k = \frac{\rho \frac{V_\sigma}{V} \frac{I_{eff,k}^r}{\Delta u_k}}{1 - \frac{1}{\Sigma_{sp}} \rho \frac{V_\sigma}{V} \frac{I_{eff,k}^o}{\Delta u_k}} \quad (7) \quad \text{or} \quad \langle \Sigma_{r,l} \rangle_k = \frac{\rho_l \frac{V_\sigma}{V} \frac{I_{eff,k}^{r,l}}{\Delta u_k}}{1 - \frac{1}{\Sigma_{sp}} \sum_i \rho_i \frac{V_\sigma}{V} \frac{I_{eff,k}^{o,i}}{\Delta u_k}} \quad (8),$$

where ρ is the nuclear density of the resonance absorber and V_σ the lump

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volume; the superscript o denotes always the sum of the fission, resonance-scattering and radiative-capture components. l enumerates the resonance absorbers of nuclear density ρ_i , if the lump contains a mixture of them. Analogous relations are obtained for the diffusion coefficient of a homogeneous medium or homogeneous isotope mixture:

$$\langle D \rangle_k = \frac{\int_V dV \int_{\Delta u_k} \frac{1}{3\Sigma_{tr}(u)} \varphi(\vec{r}, u) du}{\int_V dV \int_{\Delta u_k} \varphi(\vec{r}, u) du} \quad (10) \quad \langle D \rangle_k = \frac{\int_{\Delta u_k} \frac{\Sigma_{sp}}{\Sigma^2(u)} du}{\Delta u_k \left[1 - \frac{1}{\Sigma_{sp}} \sum_i \rho_i \frac{I_{eff,k}^{o,i}}{\Delta u_k} \right]} \quad (11).$$

The effective resonance integral

$$I_{eff}^r = \int_{E_o - \Delta E}^{E_o + \Delta E} \sigma_r \frac{\Sigma_{sp}}{\Sigma} \frac{dE}{E} + \frac{1}{d} \int_{E_o - \Delta E}^{E_o + \Delta E} \sigma_r \frac{\Sigma^o}{\Sigma} (1 - e^{-d\Sigma}) \frac{dE}{E}, \quad \Delta E \ll \Delta E_{eff}; \quad (12)$$

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which consists of volume and surface components; is then studied. A series of relationships are derived, which hold if the effective resonance width $\Delta E_{\text{eff}} < \xi E$, where $\xi = \Gamma/\Delta$, $\Delta = 2\sqrt{E_0 kT/A}$. Among others, the expression

$$I_{\text{eff}}^r = \frac{\sum_i I_R^{r,i}}{[1+x \sigma_1^{0,r}(T)]^{1/2}} + \frac{x \sum_i I_R^{r,i} \sigma_i^0}{[1+x \sigma_2^{0,r}(T)]^{3/2}} \frac{F(\alpha)}{2\alpha} \quad (29)$$

is obtained if more than one level exists, where $I_R^r = \frac{\pi}{2} \frac{\Gamma \sigma^{0,r}}{E_0}$ is the

total resonance integral of the r-th resonance interaction effect,

$x = \rho/\Sigma_{\text{sp}}$, $\alpha = d\Sigma_{\text{sp}}$, $\sigma^{0,r} = \sigma^0 \Gamma_r/\Gamma$, and

$$F(\alpha) = \phi(\sqrt{\alpha})(1+2\alpha) + \frac{2}{\pi} \sqrt{\alpha} e^{-\alpha} - 2\alpha; \quad \phi(\alpha) = \frac{2}{\sqrt{\pi}} \int_0^\alpha e^{-y^2} dy \quad (21).$$

In the case of low-lying broad levels, where ξ is large and the temperature effect can be neglected,

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$$I_{\text{eff}}^r = \sigma^{o,r} \int_{E_c}^{E_o + \Delta E} \frac{dE}{\left\{ x\sigma^o + \left[1 + \left(\frac{E - E_o}{\Gamma/2} \right)^2 \right] \sqrt{\frac{E}{E_o}} \right\} E} +$$

$$+ \frac{\sigma^{o,r}}{\alpha} x\sigma^o \int_{E_c}^{E_o + \Delta E} \frac{\left(1 - \exp \left\{ -\alpha \left[1 + \frac{x\sigma^o}{1 + \left(\frac{E - E_o}{\Gamma/2} \right)^2} \cdot \sqrt{\frac{E}{E_o}} \right] \right\} \right) dE}{\left\{ x\sigma^o + \left[1 + \left(\frac{E - E_o}{\Gamma/2} \right)^2 \right] \sqrt{\frac{E}{E_o}} \right\}^2 E}, \quad (40).$$

Finally, a large number of numerical calculations are carried out, and the relationships

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$$\langle \Sigma_{r,l} \rangle_k = \frac{\rho_l \frac{V_\delta}{V} \frac{I_{eff,k}^{r,l} + I_{R1,k}^{r,l}}{\Delta u_k}}{1 - \sum_i \rho_i \frac{V_\delta}{V} \frac{1}{(\Sigma_{sp} + \Sigma_a^{(k)} + \tilde{\Sigma}_a^{(k)})} \frac{I_{eff,k}^{o,i}}{\Delta u_k}} \quad (43)$$

$$\Sigma_d^{(k)} = \frac{\overline{\Sigma_{sp}(u_k)}}{\Delta u_k} \frac{1}{1 - \sum_i \rho_i \frac{V_\delta}{V} \frac{1}{(\Sigma_{sp} + \Sigma_a^{(k)} + \tilde{\Sigma}_a^{(k)})} \frac{I_{eff,k}^{o,i}}{\Delta u_k}} \quad (44)$$

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$$\langle D \rangle_k = \frac{1 - \frac{1}{\sum_{sp} + \sum_a^{(k)} + \sum_k^{(k)}} \sum_i \rho_i \frac{I_{R,k}^{o,i}}{2 \Delta u_k} \left\{ \frac{3}{\sqrt{1+x\sigma_1^0}} + \frac{1}{(1+x\sigma_2^0)^{3/2}} \right\}}{3(\sum_{sp} + \sum_a^{(k)} + \sum_a^{(k)}) \left[1 - \frac{1}{\sum_{sp} + \sum_a^{(k)} + \sum_a^{(k)}} \sum_i \rho_i \frac{I_{eff,k}^{o,i}}{\Delta u_k} \right]} \quad (46)$$

are given, where

$$x = \frac{\rho}{\sum_{sp} + \sum_a^{(k)} + \sum_a^{(k)}}, \quad (47)$$

$$\alpha = d(\sum_{sp} + \sum_a^{(k)} + \sum_a^{(k)}). \quad (48)$$

$\sum_a^{(k)} \varphi_k = \varphi_0 \left\{ \sum_{sp}^{(u_k)} \right\}$ (age approximation). There are 13 figures and 4 tables.

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TROYANSKIY, V.B.; SHIKHOV, S.B.

Physical reactor calculations in diffusion multigroup approximation.
Nek. vop. inzh. fiz. no.4:3-13 '63. (MIRA 16:8)
(Nuclear reactors)

L 17636-65 EWT(m)/EPF(c)/EPF(n)-2/EPR Pr-4/Ps-4/Pu-4 AFWL/SSD
ACCESSION NR: AP4045332 S/0089/64/017/003/0199/0201

AUTHOR: Khromov, V. V.; Shikhov, S. B.; Kuz'min, A. M.; Shmelev, A. N.

TITLE: Effect of flattening on certain thermal and physical characteristics of cylindrical fast reactors *14*

SOURCE: Atomnaya energiya, v. 17, no. 3, 1964, 199-201 *B*

TOPIC TAGS: fast reactor, flattened core, power reactor, reactor core, breeding ratio, breeder reactor

ABSTRACT: A method for increasing the breeding ratio of high-power, liquid-metal-cooled fast reactors is examined. The method consists in varying the ratio reactor-core height H to its diameter D without changing the volume. This process is called "flattening." The flattening coefficient is expressed as $\beta = H/D$. The effect of flattening on the thermal and physical characteristics of reactors was analyzed by means of computer calculations employing various values of flattening in a wide range of power levels and power intensities in the core. It was found that with diminishing β and constant

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power, core volume, and increase in temperature rise of the coolant, the volumetric portions of the fuel and fuel cladding material increase, while that of the coolant decreases. As β decreases from 1.0 to 0.1, the total breeding ratio increases. An increase in flattening and a constant degree of fuel burn-up increase reactor-core life. Flattening doubling time decreases the optimal, as reactor power is increased. Therefore, realization of the optimal flattening at a given power level is a simple and effective method for reducing the doubling time in fast, high-power reactors. It is noted that reactors with considerable flattening possess, in addition to a high breeding ratio, a lower hydraulic resistance for coolant flow than do those with slight flattening. Reactors with greater flattening and fuel-element diameter are preferable technologically. Orig. art. has: 3 figures.

ASSOCIATION: none

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L 17636-65

ACCESSION NR: AP4045332

SUBMITTED: 04Nov63

ENCL: 00

SUB CODE: NP

NO REF SOV: 003

OTHER: 001

Card 3/3

L 52251-65 EPP(c)/EPF(n)-2/EPR/EPA(s)-2/EWT(m)/EWG(m)/EWP(b)/EWP(t) Pr-4/Ps-4/
Ft-7/Pu-4 IJP(c) ES/WW/JD/JG/DM.

ACCESSION NR: AP5012468

UR/0089/65/018/004/0342/0350 49
46

AUTHORS: Leypunskiy, A. I.; Kazachkovskiy, O. D.; Shikhov, S. B.; 6
Murogov, V. M.

TITLE: Study of the possibility of using thorium in fast power
reactors 27

SOURCE: Atomnaya energiya, v. 18, no. 4, 1965, 342-350

TOPIC TAGS: ¹⁹fast reactor, breeder reactor, plutonium reactor,
thorium reactor, nuclear fuel, fuel burnup

ABSTRACT: In view of the difficulties involved in large-scale
economic use of U^{233} and thorium for nuclear power generation, the
authors consider the use of these materials in conjunction with the
more efficient Pu^{239} - U^{238} combination. They show that the use of a
mixed U^{233} -Th and Pu^{239} - U^{238} fuel cycle in fast reactors makes it
possible to improve markedly the characteristics of thorium-fuel fast

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ACCESSION NR: AP5012468

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reactors and to obtain a system with a fuel-doubling time which differs little from that of a pure plutonium reactor and is much shorter than that for uranium and thorium alone. In such a system the thorium is placed in the blanket and the U^{233} , U^{238} , and Pu^{239} are placed in the core. Thorium is the main fuel, and the burnup and breeding of U^{233} and Pu^{239} are such that their ratio remains constant. The characteristics are compared for both oxide and metallic fuel, using a liquid-sodium coolant at 300C with a temperature drop of 230C. Other features of the mixed-fuel reactors are somewhat lower critical mass, insignificant protactinium poisoning, reduced activity of the Th^{232} and the produced U^{233} . A method of obtaining isotopically pure U^{233} with approximately $10^{-4}\%$ U^{232} is indicated. "The authors thank M. F. Troyanov and L. N. Usachev for a useful discussion of the present results and A. N. Shmelev for the computer calculations." Orig. art. has: 4 figures, 14 formulas, and 2 tables. [02]

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L 52254-65

ACCESSION NR: AP5012468

ASSOCIATION: none

SUBMITTED: 09Jul64

ENCL: 00

SUB CODE: NP

NO REF SOV: 003

OTHER: 000

ATD PRESS: 4008

Card 3/3 MB

LEYPUNSKIY, A.I.; KAZACHKOVSKIY, O.D.; SHIKHOV, S.B.; MUROGOV, V.M.

Possible use of thorium in fast power reactors. Atom. energ. 18
no.4:342-350 Ap '65. (MIRA 18:4)

L 25437-66 EPF(n)-2/EWT(1)/EWT(m)/ETC(f)/EWG(m) WW/GS

ACC NR: AT6005813

SOURCE CODE: UR/0000/65/000/000/0005/0050

AUTHOR: Shikhov, S. B.

ORG: none

TITLE: Existence and uniqueness of a positive solution of the critical equation with allowance for moderation

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Nekotoryye voprosy fiziki i tekhniki yadernykh reaktorov (Some problems in the physics and engineering of nuclear reactors). Moscow, Atomizdat, 1965, 5-50

TOPIC TAGS: transport equation, neutron energy distribution, reactor neutron flux, operator equation, uniqueness, existence

ABSTRACT: The author analyzes the existence and uniqueness of positive solutions of the stationary nonstationary transport equations for moderation and multiplication of neutrons in a reactor, subject to the limitations that the neutron transport takes place in a bounded volume, and the neutron cross sections obey the $1/v$ law at low

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ACC NR: AT6005813

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energies. Principal attention is paid to the solution of the homogeneous criticality equation. The existence of the positive solution of this equation is proved with the aid of the principle of stationary point with respect to $L^{(p)}$ spaces, and the uniqueness is proved with the aid of theorems originally derived by M. A. Krasnosel'skiy' (Polozhitel'nyye resheniya operatornykh uravneniy [Positive Solutions of Operator Equations], Moscow, Fizmatgiz 1962). It is shown that the solutions exist when the nuclei of the medium undergo thermal motion. The solution for the nonstationary equation, obtained as a function of the initial value, exists and is unique both when the nuclei are in thermal motion and when they are stationary. Considerations that lead to an asymptotic representation of the solution are presented and a connection is given between reactivity and the parameter that defines the period of the reactor without delayed neutrons. The author thanks S. M. Feynberg for suggesting the problem and contributing to its solution by useful discussions, V. S. Vladimirov, S. N. Krachkovskiy, Ye. S. Kuznetsov, V. V. Orlov, and D. A. Vasil'kov for interesting and useful discussions. Orig. art. has: 2 figures and 119 formulas.

SUB CODE: 18 / SUBM DATE: 05Jun65/ ORIG REF: 011/ OTH REF: 008

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L 25430-66 EPF(n)-2/EWT(m)/ETC(f)/EWG(m) WW/GS
ACC NR: AT6005815 SOURCE CODE: UR/0000/65/000/000/0070/0077

AUTHORS: Slesarev, I. S.; Shikhov, S. B.; Khromov, V. V.;
Shmelev, A. N.; Kuz'min, A. M.; Shishkov, L. K.

65
B+1

ORG: none

TITLE: Design of fast reactor using electronic computers

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Nekotoryye
voprosy fiziki i tekhniki yadernykh reaktorov (Some problems in the
physics and engineering of nuclear reactors). Moscow, Atomizdat,
1965, 70-77

TOPIC TAGS: nuclear reactor technology, nuclear reactor operation,
nuclear reactor characteristics, fast reactor, computer
application, algorithm, electronic computer/ M-20 electronic computer

ABSTRACT: The purpose of the paper was to develop a computer algo-
rithm which, on the one hand, is sufficiently simple and requires few
operations, and on the other hand displays the quantitative and
qualitative characteristics of different reactor variants, so as to
permit the best design choice. A comprehensive computation program

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ACC NR: AT6005815

intended for the M-20 computer is described. This program, which is based on a single-group method proposed by one of the authors. (Shikhov, with A. I. Novozhilov, Atomnaya energiya v. 8, 209, 1960) in conjunction with the method of conditional separation of variables, makes it possible to determine the critical load for established dimensions of the reactor, to determine the reflector saving, and to evaluate the integral of many-group fluxes and the neutron importance in all the zones of the reactor. The program also includes thermal calculations which yield the diameter of the fuel elements, the heat flux to the surface, and the main heat exchange parameters and the ratio of the volumes of the components of the active zone to the total volume. In addition to this program, there has been developed at the Moscow Engineering Physics Institute a program, based on a diffusion-transport approximation, for calculating the critical parameters of a cylindrical reactor by the method of conditional separation of variables. This calculation is carried out by a multigroup method with an electronic computer, and makes it possible to calculate the critical parameters of a many-zone reactor. It is used essentially to calculate the finally chosen optimal variants of the reactors, since it requires more computer time than the foregoing comprehensive

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ACC NR: AT6005815

program. Mention is also made of a program developed under the leadership of G. I. Marchuk to solve the cylindrical problem by conditional separation of variables with a single reflector saving for all groups. This should lead to a more accurate allowance for the edge effects in the lower part of the neutron spectrum. Orig. art. has: 7 formulas and 1 table.

SUB CODE: 18,09/ SUBM DATE: 05Jun65/ ORIG REF: 001/ OTH REF: 001

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L 25439-66 EPF(n)-2/EWT(m)/ETC(f)/EWG(m) WW/GS

ACC NR: AT6005816

SOURCE CODE: UR/0000/65/000/000/0078/0084

AUTHORS: Troyanskiy, V. B.; Shikhov, S. B.

ORG: none

TITLE: Critical dimension of a reactor without reflector and the spatial-angular distribution of neutrons in the approximation of the material parameter

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Nekotoryye voprosy fiziki i tekhniki yadernykh reaktorov (Some problems in the physics and engineering of nuclear reactors). Moscow, Atomizdat, 1965, 78-84

TOPIC TAGS: neutron distribution, reactor neutron flux, nuclear reactor characteristic, transport equation

ABSTRACT: The purpose of the paper was to present an approximate calculation of the extrapolation distance and to determine the spatial-angular distribution in the asymptotic region. The calculation consists essentially of determining solutions for an infinite

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ACC NR: AT6005816

medium such as would describe in the best manner the solution of the neutron balance equation in a limited volume. It is shown first that the asymptotic spatial-angular distribution of the neutron flux in a reactor without reflector can be determined from the neutron-balance equation, and formulas are then derived for the dimensionless half-thickness of the reactor from the single-velocity kinetic equation to the results of high approximations of the method of spherical harmonics (P_0 method) and the Carlson method (S_n method). The deviation from the results of a variational method with quadratic trial function is less than 1%. The results for the extrapolation distance are more accurate in the entire range of the parameter c (defined in the text) than in the P_1 approximation. The authors thank V. V. Orlov for a valuable discussion. Orig. art. has: 2 figures, 11 formulas, and 1 table.

SUB CODE: 18 / SUBM DATE: 05Jun65/ ORIG REF: 002/ OTH REF: 004

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L 25440-66 EPF(n)-2/EWA(h)/EWT(m)/ETC(f)/EWG(m)/EWP(t) WW/JD/JG/GS

ACC NR: AT6005817

SOURCE CODE: UR/0000/65/000/000/0085/0104

AUTHORS: Shikhov, S. B.; Ignatov, A. A.; Kudryashov, Ye. I.

ORG: none

TITLE: Influence of the method of unloading the side screen of a fast breeder reactor on its doubling time

SOURCE: ⁷⁹Moscow. Inzhenerno-fizicheskiy institut. Nekotoryye voprosy fiziki i tekhniki yadernykh reaktorov (Some problems in the physics and engineering of nuclear reactors). Moscow, Atomizdat, 1965, 85-104

TOPIC TAGS: breeder reactor, nuclear reactor characteristic, nuclear material processing, uranium, plutonium

ABSTRACT: By calculating theoretically the amount of secondary fuel produced in the screen of a breeder reactor always present in the reactor between the loading-unloading cycles (defined as the 'frozen-in' fuel), the authors show that the doubling period of the total amount of fissioning material in the reactor depends strongly on the

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sequence with which the screen breeder zone is replaced with fresh stacks of raw material. Three methods of fuel replacement are considered: 1) Moving screen, in which the innermost raw uranium blocks, in which plutonium is formed first, are removed first and the outer blocks are continuously moved inward. 2) Stationary screen, where each block is replaced by a fresh one after a prescribed norm of plutonium is produced in it, regardless of its position in the reactor and without rearrangement of the blocks. 3) Two-zone moving screen, which is essentially a combination of the first two methods. The over-all rate of breeding and the breeding in the individual concentric layers of the reactor are calculated for the first method, and expressions are obtained for the distribution of the plutonium over the reactor in the other two. The influence of the amount of frozen-in plutonium on the doubling period, defined as the time elapsed before the newly produced excess fuel equals the total amount of fuel in the cycle, is determined and an equation is derived to establish the reloading method giving the best results. It is shown that the method of reloading becomes important the larger the norm of accumulation of plutonium in the raw uranium and the smaller the size of the active zone. Orig. art. has: 3 figures and 45 formulas.

SUB CODE: 18 / SUBM DATE: 05Jun65/

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ACC NR: AP7007582

SOURCE CODE: UR/0089/66/021/002/0084/0092

AUTHOR: Leypunskiy, A. I.; Kazachkovskiy, O. D.; Shikhov, S. B.; Yurova, L. N.; Kromov, V. V.; Shmelev, A. N.; Sukhoruchkin, V. K.

ORG: none

TITLE: Use of nonuranium dilutors of plutonium in large, fast breeder reactors

SOURCE: Atomnaya energiya, v. 21, no. 2, 1966, 84-92

TOPIC TAGS: breeder reactor, fast reactor

SUB CODE: 18

ABSTRACT: The physical characteristics of fast breeder reactors with cylindrical and annular active zones have been studied, together with the characteristic of infinite lattices of large fuel elements located in a heterogeneous manner within the material of the breeder zone. The paper presents in tabular form the results of theoretical calculations, discusses the influence of Pu^{240} and Pu^{241} , describes the change in reactivity during the irradiation process, and shows the results of investigation of the sodium temperature coefficient and the Doppler temperature coefficient. An analysis of the results shows that the use of nonuranium dilutors of plutonium in large fast reactors (with a large active volume) results in annular active zones and zones with fuel elements within the breeder composition zones having peculiarities which make them more economical than large cylindrical active zones. The authors thank I. S. Slesarev, A. M. Kuz'min, M. F. Troyanov, and V. M. Murogov for their part in carrying out the research and O. N. Gerasimovaya for helping to compile information in the article. Orig. art. has: 2 figures, 3 formulas and 5 tables. [JPRS: 39,417]

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UDC: 621.039.526: 621.039.543.466

ACC NR: AT7005801

(A,N)

SOURCE CODE: UR/0000/66/000/000/0003/0010

AUTHORS: Shishkov, L. K.; Shikhov, S. B.

ORG: none

TITLE: On the existence and uniqueness of a positive solution for the steady state neutron transport equation in media of nuclei being stabilized

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Inzhenerno-fizicheskiye voprosy yadernykh reaktorov (Problems of nuclear reactor engineering and physics); sbornik statey. Moscow, Atomizdat, 1966, 3-10

TOPIC TAGS: neutron transport, uniqueness theorem, existence theorem, *TRANSPORT EQUATION, NEUTRON DISTRIBUTION, DISTRIBUTION FUNCTION, OPERATOR EQUATION*

ABSTRACT: Existence and uniqueness theorems are proved for a positive solution of the steady state neutron transport equation. In operator form, the quasi-critical reactor equation is given by

$$\hat{L}n = \hat{K}_1 n + \frac{1}{\lambda} \hat{K}_2 n,$$

where n is the neutron density distribution function. In terms of characteristic values, this equation is written as

$$\hat{A}n = \lambda n,$$

where

$$\hat{A} = (1 - \hat{L}^{-1} \hat{K}_1)^{-1} \hat{L}^{-1} \hat{K}_2.$$

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It is shown that for $p' > 1$, $q' < \infty$, connected by the expression $1/p' + 1/q' = 1$, the operator A exists near some positive $\lambda = \lambda_0$ and is bounded by the positive operator $L_D^{(p)}$ for $1 \leq p < p'$. Furthermore, the operator A has unique non-negative characteristic elements n_0 in the L_D^1 space which satisfy the boundary condition $n(R, E, \Omega) = 0$. Orig. art. has: 20 equations.

SUB CODE: 12,20/ SUBM DATE: none/ ORIG REF: 005

Card 2/2

ACC NR: AT7005809 (A,N) SOURCE CODE: UR/0000/66/000/000/0096/0106

AUTHORS: Shikhov, S. B.; Ignatov, A. A.

ORG: none

TITLE: A method for calculating relaxation length of an asymptotic spectrum

SOURCE: Moscow. Inzhenerno-fizicheskiy institut. Inzhenerno-fizicheskiye voprosy yadernykh reaktorov (Problems of nuclear reactor engineering and physics); sbornik statey. Moscow, Atomizdat, 1966, 96-106

TOPIC TAGS: breeder reactor, neutron spectrum, asymptotic solution, *GAS KINETIC EQUATION*

ABSTRACT: A direct method is discussed for calculating the relaxation length and asymptotic spectra in weakly-breeding media by using multi-group P_n -approximations, including all the singularities of the scattering characteristic curve. The gas kinetic equation of neutron balance in a plane geometry is given by

$$\begin{aligned} \mu \frac{\partial \psi(x, u, \mu)}{\partial x} + \Sigma_t(u) \psi(x, u, \mu) = \int d\Omega' \int du' \psi(x, u', \mu') \Sigma_s \times \\ \times (u', u, \mu_0) + \frac{1}{4\pi} \int d\Omega' \int du' \psi(x, u', \mu') \Sigma_{ln}(u', u) + \\ + \frac{\lambda(u)}{4\pi} \int d\Omega' \int du' \psi(x, u', \mu') \nu_f(u') \Sigma_f(u'). \end{aligned} \quad (1)$$

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ACC NR: AT7005809

The P_n -approximation is given by the expansion

$$A(u, \mu) \approx \sum_{l'=0}^N \frac{2l'+1}{2} A_{l'}(u) P_{l'}(\mu); \quad (2)$$

$$\sum_{s,A} (u', u, \mu_0) \approx \sum_{s,A} (u', u) \sum_{l=0}^N \frac{2l+1}{2} P_l(\mu_0) P_l[\mu_0, A(V)].$$

which, when substituted in equation (1), leads to the following set of equations for the elements $\{A_n^k\}$

$$\lambda(L) A_n^k = \sum_{l,l'} B_{l,l'}^k(L) A_l^k. \quad (3)$$

These equations are then solved on the assumption that the set possesses a simple, positive, small modulus characteristic number to which corresponds a characteristic vector selected from the positive elements $\{A_n^k\}$. A separation-of-variables technique is used, and the characteristic numbers $\lambda(L)$ are calculated using a step-by-step iteration method. The domain where asymptotic assumptions fail is also investigated. The authors express their gratitude to A. I. Shabalov for his help in performing the calculations. Orig. art. has: 18 equations and 1 figure.

SUB CODE: 20/ SUBM DATE: none/ ORIG REF: 007/ OTH REF: 004

Card 2/2

YEREM, G.: SHENKOV, .

Sverdlovsk State University, Lab. of Electro-Chimistry (1941)

"On the Inter-Reaction of Ions in the Double Electrolytic Layer;"

Zhur. Fiz. Khim. Vol. 17, No. 4, 1943.

SHIKOV, V.

International exhibition of medical apparatus, laboratory
equipment, therapeutic preparations, and medical literature.
Radio no. 11:63-64 N '62. (MIRA 15:12)
(Medical instruments and apparatus—Exhibitions)

SHIKHOV, V.I., YESIN, O.A.

"Analyses of Rate of Slag Silicon Reduction by Liquid Iron,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of
Metallurgy, Moscow, July 1-6, 1957

SHIKHOV, V.M.

[Methodological principles for compound treatment at the
Sochi-Matsesta Health Resort] Metodicheskie osnovy kor-
pleksnogo lecheniia na kurorte Sochi-Matsesta. Krasnodar,
Krasnodarskoe knizhnoe izd-vo, 1958. 148 p.

(MIRA 15:5)

(SOCHI—HEALTH RESORTS, WATERING PLACES, ETC.)

1ST AND 2ND GROUPS		3RD AND 4TH GROUPS	
PROCEDURES AND PROPERTIES INDEX		COMMON VARIANTS INDEX	
<p>Interfacial potential in an electric double layer. O. Ekin and V. G. Gerasimov, <i>J. Phys. Chem. (U. S. S. R.)</i> 17, 230-40 (1943).—The relations between the potentials of the maxima of the electrocapillary curves and the concns. of the solns. of NaCl, NaBr, KCNS and KI are shown graphically and in a table. In a math. supplement the extent of surface coverage is calcd. approx. for a limiting case. F. H. Rathmann</p>			
<p>ASAC-34A METALLURGICAL LITERATURE CLASSIFICATION</p>			
MATERIALS INDEX		FROM DONORS	
1ST AND 2ND GROUPS		3RD AND 4TH GROUPS	

SHIKHOV, V. N.

"Investigating the Kinetics of Dephosphorizing and Desulfurizing Liquid Iron Slags." Cand Tech Sci, Ural Polytechnic Inst, Sverdlovsk, 1954. (RZhKhim, No 4, Feb 55)

SO: Sum. No. 631, 26 Aug 55-Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (14)

USSR/Engineering - Metallurgy

FD-2242

Card 1/1 Pub 41-10/17

Author : Yesin, O. A. and Shikhov, V. N., Sverdlovsk

Title : Investigation of the limiting stages in the process of the desulfurization of liquid iron by slag

Periodical : Izv. AN SSSR, Otd. Tekh. Nauk 2, 105-112, Feb 1955

Abstract : Attempts to identify the limiting stages in the desulfurization of liquid iron with slag. Develops methodology. Investigates the effect of initial concentration of sulfur in metal on the rate of desulfurization. Studies the effect of temperature on rate of desulfurization. Diagrams, tables. Twelve references, 8 USSR.

Institution: Ural Polytechnic Institute

Submitted : January 5, 1955

SHIDRO N
USSR/Engineering - Metallurgy

FD-2991

Card 1/1 Pub. 41 - 4/12

Author : Yesin, O. A. and Shikhov, V. N., Sverdlovsk

Title : A study on the kinetics of dephosphorization of liquid iron by
slag

Periodical : Izv. AN. SSSR, Otd. Tekh. Nauk, 3, 79-89, March 1955

Abstract : Describes the methodology of the experiment conducted and analyzes
the findings. The study brought out the fact that the speed with
which dephosphorization takes place depends on the chemical reac-
tion of the phosphorous with the slag, rather than on convection
and thus physical exposure of the phosphorous to the slag. The
area of contact between the slag and the iron and not the height
of the slag layer influences dephosphorization. The hypothesis is
proposed that the stage which determines the speed of the reaction
of phosphorization, is the desorbtion of the anion (PO_4^{3-}) at the
slag-to-metal surface. Tables, graphs, formulae. Twelve refer-
ences, 9 USSR.

Institution : Ural Polytechnic Institute imeni S. M. Kirov

Submitted : January 5, 1955

SHIKHOV, V. N.

✓ Methods of introduction of phosphorus active isotopes into the metal and the slag. V. N. Shikhov, *Zavodskaya Lab.* 21, 1482-3 (1955).—The method recommended for accurate work consists in dissolving a mixt. of P^{32} as red P. mixed with the ordinary red P in proportion of 1:50 or 1:300, in concd. HNO_3 (dissolving the ordinary P first to reduce the adsorption of P^{32}). Ferrous oxalate is next added to the soln., the soln. dried, ignited, and reduced with H_2 at 750° in a tubular elec. furnace. In this way, a standard tagged sample of ferrophosphorus is obtained. All distn. products of P are absorbed in HNO_3 without contaminating the lab. air. Owing to sublimation of P and the pyrophosphates during the reduction, the P^{32} content of the ferrophosphorus must be found, which is best done by radioassay of a HNO_3 soln. of the sample. W. M. Sternberg

Ural Polytech Inst

SHIKHOV, V. N.
USSR/Metallurgy - Chemical technology

Card 1/1 Pub. 22 - 36/59

Authors : Yesin, O. A., and Shikhov, V. N.

Title : The process of dephosphorization of liquid iron with slag

Periodical : Dok. AN SSSR 102/2, 327-330, May 11, 1955

Abstract : The experiments on the dephosphorization of liquid iron were carried out in an electric furnace with carbon resistance at a temperature of about 1550° and nitrogen atmosphere. The dephosphorization stages are described. The P content in the samples was determined by means of an aluminum beta-counter. Results obtained are given in graphs. Six references: 5 USSR and 1 Engl. (1946-1954). Graphs; drawing.

Institution : Ural Polytechnic Inst. im. S.M.Kirov, Sverdlovsk

Presented by : Academician I. B. Bardin, December 9, 1954

SHIKHOV, V. N.

USSR/ Chemistry - Chemical technology

Card 1/1 Pub. 22 -43/62

Authors : Yesin, O. A., and Shikhov, V. N.

Title : The kinetics of sulfur distribution between liquid iron and slag

Periodical : Dok. AN SSSR 102/3, 583 - 586, May 21, 1955

Abstract : Experiments were conducted with technically pure Fe containing 0.05% C, 0.06% Si, 0.003% P and 0.005% S and three types of slag of different basicity at temperatures of 1550 - 1700° to determine the kinetics of S-distribution between the melted iron and the slag. The introduction of S³⁵ and Fe⁵⁹ isotopes into the metal made it possible to discover that the desulfurization of the iron with acid slag (at 1580°) was followed by simultaneous conversion of the S and Fe into slag and that the conversion of large S quantities into basic or neutral slag is not accompanied (at 1560°) by an increase in Fe content in the slag. Six references: 4 USSR and 2 USA (1945-1952). Table; graphs.

Institution : The S. M. Kirov Ural Polytechnic Institute, Sverdlovsk

Presented by: Academician I. P. Bardin, December 9, 1954

SHIKHOV, V. N., and YESIN, O. A.

"Methods of Using Radioactive Isotopes in the Examination of Kinetic Fusion of Metal with Slag" paper read at the International Metallurgists' Conference, Moscow 26-30 June 56.

SO: CS-3,302,240, 11 Jan 57.

USSR/ Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry.
Catalysis

B-9

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11258

Author : Yesin O.A., Shikhov V.N.

Inst : Department of Technical Sciences, Academy of Sciences USSR

Title : On Kinetics of Silicon-Reduction Process

Orig Pub : Izv. AN SSSR, Otd. tekhn. n., 1956, No 6, 113-118

Abstract : Study of kinetics of the reduction of silicon with liquid iron in slag $MO - Al_2O_3 - SiO_2$, saturated with SiO_2 . Rate of the process is determined from the amount of radioisotope Fe^{59} , that passes from Fe into the slag as Fe^{2+} . Depth of slag layer does not affect rate of reaction, i.e., complications due to diffusion are apparently absent. Reduction rate decreases greatly on replacement of MgO , in the slag, by CaO or BaO . Determined were the apparent energies of activation for slags of different composition: with 64.4% SiO_2 + 32.1% MgO (at 1560-1660°) 51 kcal; with 61.2% SiO_2 + 19.4% CaO + 17.4% Al_2O_3 (at 1580-1620°) 66.5 kcal; with 59.1% SiO_2 + 37.3% BaO (at 1580-1680°) 148 kcal. It is assumed that effect of cations on rate of process is due to different degree of weakening of bonds between Si and O atoms in the slag.

1/1

SOV/137-59-2-2365

The Kinetics of Dephosphorization and Desulfurization of Metal by Slag

it was established that the rate of the reaction proceeds according to the following equation: $[S]_{\text{met}} + (O^{2-})_{\text{sl}} \rightleftharpoons [O]_{\text{met}} + (S^{2-})_{\text{sl}}$ and is limited by the [rate of] diffusion of S in the slag. The reaction is of the first order. The reaction of desulfurization of Fe by an acid slag has a fractional order and proceeds according to the following equation: $[S]_{\text{met}} + [Fe]_{\text{met}} \rightleftharpoons (Fe^{2-})_{\text{sl}} + (S^{2-})_{\text{sl}}$, i. e., it is accompanied by simultaneous transfer of S and Fe into the slag. The limiting stage of this reaction is the migration of ions of S and Fe through the phase boundary.

I. K.

Card 2/2

SOV/137-58-7-14228

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 7, p 38 (USSR)

AUTHORS: Yesin, N.A., Shikhov, V.N.

TITLE: Order of the Reaction and Limiting Stages of the Process of Dephosphorization of Steel (Poryadok reaktsii i limitiruyushchiye stadii protsessa obesfosforivaniya stali)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 69-77

ABSTRACT: Experiments conducted to clarify the effect of the initial [P] on the rate of its passage into the slag at 1550°C have shown that with an increase in the initial [P] the rate of its passage into the slag also increases while the time needed for the establishment of equilibrium decreases; [P] was varied in five steps from 0.004 to 0.1%. The time required for the establishment of equilibrium during the reverse passage of [P] from the slag into the metal also decreases with the increase of the initial [P]. In order to determine the order of the dephosphorization reaction, the methods of evaluation of the order of the direct and the reverse reaction were used. As a result of the calculations quoted and construction of curves it is found that the process of the passage of [P] from the metal into the

Card 1/2

SOV/137-58-7-14228

Order of the Reaction and Limiting Stages of the Process (cont.)

slag and back follows the second order of reaction. Observations on the passage of the [P] into the slag and back and the curves of the variation of concentrations of the final and initial material have shown that the dephosphorization reaction proceeds through several intermediate stages; here it is assumed that the stage which determines the rate of this reaction is the desorption of the PO_4^{3-} anion into the slag from the interface between the phases

Ye.T.

1. Steel---Processing 2. Slags---Chemical reaction 3. Phosphorus---Chemical reaction
4. Phosphorus---Chemical reactions

Card 2/2

137-58-6-11506

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 36 (USSR)

AUTHOR: Shikhov, V.N.

TITLE: A Method of Investigating the Kinetics of a High-temperature Process (Metodika issledovaniya kinetiki vysokotemperaturnogo protsessa)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 78-91

ABSTRACT: The kinetics of the distribution of P and S between the metal and the slag is studied with the aid of isotopes P^{32} and S^{35} . The experiments were conducted in a laboratory furnace with a graphite heater and in fused-magnesium crucibles having two hollows in the form of connecting vessels. The temperature was measured by optical pyrometer to an accuracy of $\pm 15^{\circ}\text{C}$. In studying the kinetics of the P transfer, the contact interface between metal and slag was $\sim 0.2\text{cm}^2$. Technical Fe was the metal used. The weight of metal in the experiments was 4-30 g, that of the slag was $\sim 4-50$ g. The slags were prepared from pure oxides. When the metal and the slag fused, an alloying element containing the isotopes was introduced, and a slag specimen (30-50 mg) was taken 10 to 20 sec later. The

Card 1/2

137-58-6-11506

A Method of Investigating the Kinetics of a High-temperature Process

radioactivity of the specimens of metal and slag, when measured in terms of P^{32} , was determined from powders in layer thicknesses of $\sim 300 \text{ mg/cm}^2$; when S^{35} was used, cylindrical specimens 4 mm in diam and 2 mm high were employed. The accuracy of the changes measured radiometrically is $\pm 5\%$. The results of the experiments in the kinetics of desulfurization and dephosphorization are in qualitative agreement with the literature data.

I.K.

1. Slags--Properties
2. Metals (Liquid)--Properties
3. Chemical reactions--Analysis
4. Phosphorus--Determination
5. Sulfur--Determination
6. Phosphorus isotopes (Radioactive)--Applications
7. Sulfur isotopes (Radioactive)--Applications

Card 2/2

SOV/137-58-10-20471

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 18 (USSR)

AUTHORS: Yesin, O. A., Shikhov, V. N.

TITLE: Effect of Slag Composition and Temperature Upon Metal
Dephosphorization Rate (Vliyaniye sostava shlaka i temperatury
na skorost' obesforsforivaniya metalla)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 72, pp 237-245

ABSTRACT: It is established that substitution of FeO by CaO accelerates the dephosphorization (D) process. An increase of 11% in (CaO) results in the time required for attainment of equilibrium to be diminished from 9 to 6.5 min. Replacement of FeO by SiO₂ and Al₂O₃ reduces the D rate, V_p . An increase in (SiO₂) from 7 to 22% cuts the average V_p in half. An increase in (Al₂O₃) from 6 to 20% reduces the mean V_p by a factor of 1.5. O anions play a significant role in D. The increase in V_p when FeO is replaced by CaO is explained by a weakening of the bonds of the O ions with the slag cations, and also by the higher heat of formation of Ca₃(PO₄)₂. When FeO is replaced by SiO₂ and Al₂O₃ there is an increase in the bond energy of

Card 1/2

SOV/137-58-10-20471

Effect of Slag Composition and Temperature (cont.)

the ions to the slags due to formation of adequately stable silicate complexes. When FeO is replaced by BaO, V_p increases. An increase from 10 to 17% in BaO increases V_p approximately 25-fold. Substitution of FeO by MgO to the extent of from 4 to 20 percent does not affect V_p . The effect of temperature upon V_p is studied at 1550, 1590, and 1690°C for the following slag (%): CaO 10.05, FeO 66.72, Fe₂O₃ 16.23, MgO 4.85. The average V_p rises with increase in temperature, but the equilibrium [P] then declines. The following distribution coefficients have been derived: at 1640° $K_1=0.5$; at 1550° $K_2=0.9$. From this: $\Delta H = -2.3R (\log_{10}K_2 - \log_{10}K_1)/(1/T_2 - 1/T_1) = -4.575 (\log_{10} 0.9 - \log_{10} 0.5)/(5.38 - 5.1) \cdot 10^{-4} = 40,800 \text{ cal/mole}$.

S. L.

1. Slags--Properties
2. Metal oxides--Chemical effects
3. Slags--Temperature factors

Card 2/2

137-58-6-11504

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 36 (USSR)

AUTHORS: Yesin, O.A., Shikhov, V.N.

TITLE: The Kinetics of the Reduction of Silicon by Molten Iron (Kinetika vosstanovleniya kremniya zhidkhim zhelezom)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 72, pp 246-251

ABSTRACT: Radioisotope Fe⁵⁹ is used to investigate the kinetics of the $\text{SiO}_2 + 2[\text{Fe}] = 2(\text{FeO}) + [\text{Si}]$ reaction. The Fe⁵⁹ was introduced into molten technical Fe, which was kept in a quartz crucible under an N₂ atmosphere within a carbon-resistance furnace, beneath slags made of SiO₂, Al₂O₃, CaO, MgO, and BaO. The rate of reduction of the Si by molten Fe is determined by the rate at which the Fe⁵⁹ goes into the slag. Results of experiments with slag containing 61.2% SiO₂, 17.30% Al₂O₃, 19.43% CaO at 1580, 1620, and 1670°C show the energy of activation of the process to be 64,000 cal/mole. A change in the height of the slag layer from 8 to 25 mm does not affect the process rate. These data support the conclusion that the limiting factor in the process of Si reduction is not the diffusion of Fe ions in the slag or of Si in the metal, but the chemical activity.

Card 1/2

137-58-6-11504

The Kinetics of the Reduction of Silicon by Molten Iron

Experiments conducted with slags consisting of 32.1% MgO and 66.4% SiO₂, 34.6% CaO and 64.18% SiO₂, 37.72% BaO and 59.11% SiO₂ at 1580° showed that replacement of MgO by CaO diminishes the rate of Si reduction by 82%, while when BaO is used it is reduced by more than 90%. These facts have clarified the differing influence of the Mg²⁺, Ca²⁺, and B²⁺ cations on the strength of the bond between Si and O in the slag.

I.T.

1. Silicon--Reduction 2. Iron (Liquid)--Applications 3. Iron isotopes (Radioactive)
--Applications 4. Slags--Properties

Card 2/2

18(3)

AUTHORS: Shikhov, V.N., Yasin, O.A.

SOV/163-58-4-4/47

TITLE: Distribution of Phosphorus Between Iron and Barium Slags
(Raspredeleniye fosfora mezhdu zhelezom i bariyevymi shlakami)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4,
pp 23 - 27 (USSR)

ABSTRACT: In the paper (Ref 1) it is assumed that by substituting calcium oxide by barium oxide in the slag it should be possible to eliminate phosphorus from the metal to a higher extent. In order to obtain direct confirmations by tests the equilibrium of the phosphorus between iron and slags containing barium oxide was analyzed. The experimental method used has already been described in the paper (Ref 4). Technically pure iron was employed for the tests. The slags consisted of synthetic alloys of oxides of calcium, barium, silicon, magnesium and iron. The concentration of BaO varied between 5 and 35 %. The tests showed an increase of the distribution index of phosphorus within the composition range investigated, like the ratio of the radioactivities of the slag to those of the metal, with the rising content of calcium oxide as well as of barium oxide. In order to clarify the effect of substituting CaO by BaO the

Card 1/3

Distribution of Phosphorus Between Iron and Barium Slags SOV/163-58-4-4/47

constants of the reaction of equilibrium at dephosphorization were calculated by the formula of P.Gerasimenko (Ref 1) (1). A comparison with the results calculated by the formula of Kozheurov (Ref 7) does not show a great difference. - It is shown that at least O^{2-} and Fe^{2+} -ions should be contained in the slag for dephosphorization of the metal. Phosphorus can only turn into a slag consisting of iron oxide. The distribution factors, however, are not remarkable in such a case. The presence of Fe^{2+} ions in the slag permits the transition of phosphorus whilst the ions of barium contribute to complete the transition. The introduction of the cation of Si^{4+} or of Al^{3+} into the slag will bind the O^{2-} ions still more, and reduce the distribution factor of phosphorus. It is shown how the degree of dephosphorization increases with the basicity of the slag at a constant ratio BaO/FeO . There are 2 figures, 3 tables, and 9 references, 6 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural Polytechnic Institute)

Card 2/3

SOV/2117

PHASE I BOOK EXPLOITATION

24(8)

Soveshchaniya po eksperimental'noy tekhnike i metodam vysokotemperaturnykh issledovaniy, 1956

Experimental'naya tekhnika i metody issledovaniy pri vysokikh temperaturakh; trudy soveshchaniya po eksperimental'nykh tekhnike i metodam issledovaniy pri vysokikh temperaturakh; Transactions of the Conference on Experimental Techniques and Methods of Investigation at High Temperatures. Moscow, USSR, 1959. 789 p. (Series: Akademiya nauk SSSR. Institut metallurgii. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali) 2,200 copies printed.

Resp. Ed.: A. M. Samarin, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: A. L. Bankviter.

PURPOSE: This book is intended for metallurgists and metallurgical engineers.

COVERAGE: This collection of scientific papers is divided into six parts: 1) thermodynamic activity and kinetics of high-temperature processes 2) constitution diagram studies 3) physical properties of liquid metals and slags 4) new analytical methods and production of pure metals 5) pyrometry, and 6) general questions. For more specific coverage, see Table of Contents.

SOV/2117

Experimental Techniques and Methods (Cont.)

Wilipoy, S. I. A Study of the Kinetics of the Decarburization of Steels. A description is given of methods and equipment for studying the kinetics of slag-metal reactions, especially desulfurization and dephosphorization. Use is made of the isotopes 335 , 232 , 56 , and others. 108

Chou, Yang-shih. Thermodynamics of Liquid Blast-Furnace Slags 113

Shikhov, V. M., and O. A. Yedin. Methods of Using Radioactive Isotopes for Studying the Kinetics of Metal-Slag Reactions 123

Shchedrin, V. M. Stand for Studying High-Temperature Reduction Processes Under Pressure 131

Hyatt, R. A., and P. V. Gel'd. Rate of Hydrogen Diffusion in Steels at High Temperatures 147

The rate of diffusion at a given temperature was determined on the basis of the quantity of hydrogen diffusing per unit time through a unit section of fixed thickness, as measured by the drop in pressure. The effect of alloying elements (carbon, chromium, vanadium, silicon, manganese, and nickel) on the decomposition of austenite, and pressure on the rate of diffusion were studied.

S/032/61/027/002/005/026
B134/B206

AUTHOR: Shikhov, V. N.

TITLE: Methods of introducing radioactive sulfur in metal

PERIODICAL: Zavodskaya laboratoriya, v. 27, no. 2, 1961, 165-166

TEXT: The method of radioactive isotopes is frequently used to study the desulfurization of metals. In laboratory tests, S^{35} with a total activity of from 0.1 to 10 microcuries is introduced into the melt; the activity may reach 1 microcurie and more in works tests if autoradiographic tests are to be made on the workpiece. In the present case, a method is described for the preparation of active iron sulfide from sodium sulfide by which preparations of a certain activity can be made. An inactive NaS solution is added to the active NaS^{35} solution up to the required activity, and the stoichiometric quantity of $FeCl_2$ is then added. The active FeS precipitate is rinsed, dried, and stored. The storability is, however, limited since FeS is oxidizable, and, moreover, the preparation has the drawback that active H_2S develops.

Card 1/2

Methods of introducing

S/032/61/027/002/005/026
B134/B206

If small amounts of Co or Ni do not disturb the study, S^{35} can be used in the form of active cobalt- or nickel sulfide. By means of an electric melting furnace it was investigated how much of the active sulfur is dragged along when air is led through the melt (approximately 7 l/min) with the application of various active preparations. The activated melt was heated to 1580°C , and the air led through was collected in a 5% KClO_3 solution where SO_2 and SO_3 were completely absorbed. The active sulfur was precipitated as BaSO_4 , and the activity of the filtered precipitate was determined with a counter. It was established that the volatility of sulfur was proportional to the amount of sulfur added. The lowest volatility was observed with the application of active cobalt- and nickel sulfide; the volatility was twice as high when FeS^{35} was used, and 7 to 8 times as high with addition of elementary S^{35} . There are 1 figure and 2 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut
(Ural Polytechnic Institute)

Card 2/2

SHIKHOV, V.N.

Kinetics of the desulfuration of iron. Trudy Ural. politekh.
inst. no.93:100-110 '59. (MIRA 15:3)
(Iron--Metallurgy) (Desulfuration)

SHIKHOV, V.N.

Mechanism of the desulfuration of steel. Trudy Ural. politekh.
inst. no.93:111-122 '59. (MIRA 15:3)
(Steel--Metallurgy) (Desulfuration)

SHIKHOV, Vadim Nikolayevich; SHTOL'TS, A.K., inzh., retsenzent;
DUGINA, N.A., tekhn. red.

[Safety measures in handling radioactive substances] Tekhnika
bezopasnosti pri rabote s radioaktivnymi veshchestvami. Mo-
skva, Mashgiz, 1962. 86 p. (MIRA 16:2)
(Radioactivity--Safety measures)

electrical

SHIKHOV, V.N.

✓
Device for detecting static charges. Neft. khoz. 40 no. 3:70-72 Ag
'62. (MIRA 17:2) X

SHIKHOV, V.N.; MAKURIN, P.I.; NIKULIN, V.F.

Shielding the dangerous zone of circular saws. Der. prom. 12
no.3:25-26 Mr '63. (MIRA 16:5)

1. Ural'skiy politekhnicheskiy institut im. S.M.Kirova.
(Circular saws--Safety measures)

SHIKHOV, V.N.; POPOV, S.F.

Instruments for measuring static electric charges. Neft.
khoz. 41 no. 12:49-54 D '63. (MIRA 17:6)

SHIKHOV, V.N., kand. na tekhn. nauki

Induction neutralizer of static electricity. Tekstilna prom 13
no.6:32-34 '64.

SHIKHOV, V.N.; NIKULINA, L.P.

Investigating the process of electrization in a fiber during
spreading. Kauch. i rez. 23 no.4:42-45 Ap'64 (MIRA 17:7)

1. Ural'skiy politekhnicheskiy institut, Sverdlovsk.

SHIKHOV, V.N.

Catalytic agent for furnaces to ease the starting of motor
vehicle engines in winter. Avt. prom. 30 no.8:11 Ag '64.
(MIRA 17:11)

1. Ural'skiy politekhnicheskii institut imeni Kirova.

L 29672-66 EEC(k)-2/EWT(d)

ACC NR: AP6009172

SOURCE CODE: UR/0146/65/008/005/0024/0026

AUTHOR: Shikhov, V. N.; Sitnikov, V. P.; Petrov, O. A.

22
B

ORG: Ural Polytechnic Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut);
Chelyabinsk Polytechnic Institute (Chelyabinskiy politekhnicheskiy institut)

TITLE: Semiconductor instrument for measuring static-electricity charge

SOURCE: IVUZ. Priborostroyeniye, v. 8, no. 5, 1965, 24-26

TOPIC TAGS: electricity, ~~static~~ electricity measurement

ABSTRACT: The development of a new semiconductor instrument for measuring electrostatic potential or surface charge density is briefly reported. Operating on the well-known electrostatic-generator principle, the instrument includes a 3-stage transistorized (P13A) amplifier with a gain of 30--40 in each stage; the instrument's circuit diagram is shown. The laboratory model has a range of 10^{-12} -- 10^{-9} coulombs/cm². The instrument is intended for measuring static electricity charges in the textile, printing, petroleum, paper, and other industries. Orig. art. has: 1 figure.

SUB CODE: 09 / SUBM DATE: 04Jul64 / ORIG REF: 008

Card 1/1 CC

UDC: 621.317.713

SHIKHOV, V.N.; TITOVA, T.P.

Studying the electrification of polyethylene films during
the production process. Plast. massy no. 12:27-28 '65
(MIRA 19:1)

SHIKHOV, V.N.; SITNIKOV, V.P.; PETROV, O.A.

Semiconductor meter of the magnitudes of charges of static
electricity. Izv. vys. ucheb. zav.; prib. 8 no.5:24-26 '65.
(MIRA 18:10)
1. Ural'skiy politekhnicheskiy institut. Rekomendovana kafedroy
tekhniki bezopasnosti.

SHIKHOV, V.N.; ANISIMOV, V.A.; Prinimali uchastiye: MAKURIN, P.I.;
NIKULINA, L.P.; TKACHEV, V.V.; NEMTSEV, I.I.; MIKHEYEVA, G.P.;
GUSEV, V.P.; TARASOV, A.I.

Measures for the control of static electricity in rubber cement
coaters. Kauch. i rez. 24 no.11:42-45 '65. (MIRA 19:1)

1. Ural'skiy politekhnicheskii institut, Sverdlovsk, i Sverdlovskiy
zavod rezinovykh tekhnicheskikh izdeliy.

MALYSHEV, Yu.M.; ~~SHIKHOV~~ V.V.; SHMATOV, V.F.

Problems of economics in the use of sulfur-bearing oils.
Khim. i tekhn. topl. i masel. 8 no.3:37-43 Mr '63.
(MIRA 16:4)

1. Bashkirskiy filial AN SSSR.
(Petroleum industry) (Petroleum—Refining)
(Sulfur compounds)

SHIKHOV, Vladimir Vasil'yevich; SHAFIKOV, G., kand.ekonom.nauk, red.;
KAMENEV, N.P., red.; GAL'CHENKO, S.I., tekhn.red.

[Ways of increasing labor productivity in industrial enterprises]
Puti povysheniia proizvoditel'nosti truda na promyshlennom pred-
priatii (na primere sodovoi promyshlennosti). Pod red. G.Sha-
fikova. Ufa, Bashkirscoe knizhnoe izd-vo, 1958. 108 p.
(MIRA 12:7)

(Soda industry--Labor productivity)

SHIKHOV, V. YA.

S/275/63/000/002/004/032
D405/D501

Levin, V.M., Khokhlov, V.K., Semenov, A.N., Romyantsev, V.V., Stepanov, S.M., Suslenko, V.K., Pomin, L.P., Shikhov, V.Ya. and Chubinskaya, I.L.

Linear 5-35 Mev electron accelerator with X-ray head for medical purposes

SYNOPSIS:

Referativnyy zhurnal, Elektronika i eye primeneniye, no. 2, 1965, 46, abstract 2A269 (Elektron. uskori-teli, Tomsk, Tomskiy un-t, 1961, 10-15 (Collection))

TEXT:

A pulsed accelerator is described. The frequency of the microwave field is about 2800 Mc; the electron energy can smoothly vary from 3 to 35 Mev; the mean electron current in the entire range can be brought to 18 microampere. The technical characteristics and the design of the accelerator are described. The accelerating system, the microwave supply, the vacuum system and the X-ray head device are considered in detail. All the accelerator elements were tested on laboratory stands and the working drawings

Card 1/2

Linear 5-35 Mev electron ...

S/275/63/000/002/004/032
D405/D301

for the entire equipment were given over to a plant for serial
production.

[Abstracter's note: Complete translation]

Card 2/2

SHIKHOV, V.V.

Correlation between the content of sulfur and tar in petroleum
and their viscosity. Khim. i tekhn. topl. i masel 9 no.9:23-26
S '64. (MIRA 17:10)

SHEVELKIN, B.N., kand. tekhn. nauk; SHIKHOV, Yu.V., kand. tekhn. nauk

Ensure more widespread introduction of pressure working
methods. Khim. i nef. mashinostr. no.2:44-46 Ag '64
(MIRA 18:1)

SHIKHOVA, N.M., dotsent; DMITRIYEVA, F.I. (Sochi)

Combined affections of blood vessels of the extremities, brain,
and internal organs in endarteritis obliterans. Vrach.delo no.2:
117-120 F '56. (MLRA 9:7)

1. Vtoraya terapevticheskaya klinika (zaveduyushchiy dotsent N.M.
Shikhova) Bal'neologicheskogo nauchno-issledovatel'skogo insituta
imeni I.V.Stalina.
(ARTERIES--DISEASES)

3. Shikova, N.M.
LUTAI, D.P.; SHIKHOVA, N.M.; REKKANDT, A.A. (Sochi)

Effect of steroid hormones on the peripheral lymphatics of animals
with experimental allergic arthritis. Vrach.delo supplement
'57:24-25 (MIRA 11:3)

1. Institut revmatizmz Ministerstva zdravookhraneniya RSFSR.
(CORTISONE) (LYMPHATICS)

KOPTOVA, Ye.G.; SHIKHOVA, N.M.; KAPLUN, S.Ya.; SHIKHOV, M.M. (Sochi)

Experimental myocardial infarct and hydrogen sulfide baths [with summary in English]. Arkh.pat. 19 no.5:45-53 '57. (MLRA 10:8)

1. Iz fiziologicheskoy laboratorii (zav. - doktor biologicheskikh nauk S.Ya.Kaplun) i terapevticheskoy kliniki (zav. - prof. M.M.Shikhov) Nauchno-issledovatel'skogo bal'neologicheskogo instituta imeni I.V. Stalina (dir. - dotsent N.P.Vladimirov)

(MYOCARDIAL INFARCT, exper.

eff. of hydrogen sulfide baths in dogs)

(BALNEOLOGY, in various dis.

hydrogen sulfide baths in experimental myocardial infarct in dogs)

Country : USSR
Category: Pharmacology. Toxicology. Anti-Infection Agents.

Abs Jour: RZhBiol., No 6, 1959, No 27848

Author : Kaplun, S.Ya.; Kepteva, Ye. G.; Shikhova, N.M.;
Shikhov, M.M.

Inst : -

Title : The Influence of Salycilamide on Compensatory Processes Under the Conditions of Experimental Disruption of Coronary Circulation.

Orig Pub: Vrachebn. delo, 1958, No 4, 429-432

Abstract: The experiments were conducted on dogs with a ligated anterior descending branch of the left coronary artery. As controls, dogs without surgical interventions of the heart were utilized. The

Card : 1/3

Country : USSR
Category: Pharmacology. Toxicology. Anti-Infection Agents.

Abs Jour: RZhBiol., No 6, 1959, No 27848

method of electrocardiography in three standard leads was utilized; the blood pressure was measured in the carotid artery which was abduced into a skin flap. Salycilamide (I) was introduced orally in a dose of 0.15 g/kg each for the duration of 25 days. Three dogs were taken for testing the action of I 1 year after ligation of the coronary artery. The fourth dog was the control. On the basis of changes of the ECG, a conclusion is made that the first and last intakes of I decrease deviations from normal; in the interval between them, unfavorable conditions for cardiac activity form. To the same dogs, for the duration of 25 days before and at the time of testing, thyroidin (II) was introduced

Card : 2/3

GRIGOR'YEV, I.I., kand.med.nauk; SHIKHOVA, N.M., dotsent; KURAMSHINA, M.G.,
kand.biol.nauk

Elimination of streptococci in rheumatic fever. Vrach.delo no.6:585-
587 Je '59. (MIRA 12:12)

1. Sochinskiy nauchno-issledovatel'skiy institut revmatizma.
(RHEUMATIC FEVER) (STREPTOCOCCUS)

LUTAI, D.P.; SHIKHOVA, N.M.; REKKANDT, A.A.

Changes in the peripheral lymph system in experimental allergic arthritis and the effect of Matsesta bolneologic procedures on such changes; X-ray experimental study. Vop. kur., fizioter i lech. fiz. kul't. 24 no.6:492-498 N-D '59. (MIRA 15:1)

1. Iz rentgenovskogo otdeleniya (zav. - prof. D.P.Lutai) Nauchno-issledovatel'skogo bal'neologicheskogo instituta v Sochi (dir. - dotsent N.P.Vladimirov).
(ARTHRITIS) (LYMPHATICS__DISEASES)
(SOCHI__THERAPEUTICS, PHYSIOLOGICAL)

KURAMSHINA, M.G.; SHIKHOVA, N.M.; GRIGOR'YEV, I.I.; KONOKOVA, Ye.I.;
BABKINA, V.L.

Immunological indexes and the biological activity of streptococci
in the combined treatment of rheumatic fever. Vrach. delo no.9:20-
24 S '60. (MIRA 13:9)

1. Sochinskiy nauchno-issledovatel'skiy institut kurortologii.
(ANTIGENS AND ANTIBODIES) (STREPTOCOCCUS)
(RHEUMATIC FEVER)

GRIGOR'YEV, I.I.; SHIKHOVA, N.M.; VLADIMIROVA, Z.Ya.; KRESIKOVA, I.A.;
PATRUSHEVA, A.V.

Prevention of rheumatic fever under operating conditions of
rheumatological clinics. Vrach. delo no:9:31-33 S '60.
(MIRA 13:9)

1. Sochinskiy nauchno-issledovatel'skiy institut kurortologii.
(RHEUMATIC FEVER)

KAPLUN, S.Ya.; KOPTEVA, Ye.G.; SHIKHOVA, N.M.; SHIKHOV, M.M.

New data on the effect of hydrogen sulfide baths on animals with experimentally induced disorders of the cardiac blood supply.

Vop. kur., fizioter. i lech. fiz. kul't. 25 no.4:304-309 J1-Ag '60.
(MIRA 13:9)

1. Iz Nauchno-issledovatel'skogo instituta revmatizma v Sochi (dir. - dotsent N.P. Vladimirov).

(HYDROGEN SULFIDE—PHYSIOLOGICAL EFFECT)
(CORONARY VESSELS)

SHIKHOV, M.M., prof.; SHIKHOVA, N.M., dotsent; KAPLUN, S.Ya., doktor biol. nauk; KOPTEVA, Ye.G., kand.med.nauk

Effect of salicylates on cardiac activity in experimental disturbance of the coronary circulation (electrocardiographic data). Vrach. delo no.6:14-18 Je '61. (MIRA 15:1)

1. Laboratoriya eksperimental'noy patologii (zav. - doktor biol. nauk S.Ya. Kaplun) i terapevticheskaya klinika Sochinskogo instituta kurortologii (zaveduyushchiy - zasluzhennyy deyatel' nauki, prof. M.M.Shikhov).

(SALICYLATES) (ELECTROCARDIOGRAPHY)
(BLOOD CIRCULATION, DISORDERS OF)

KURAMSHINA, M.G.; SHIKHOVA, N.M.; KONKOVA, Ye.I.; BAEKINA, V.L.

Dynamics of immunological indices in rheumatic patients.
Kaz.med. zhur. 4:7-8 J1-Ag'63 (MIRA 17:2)

1. Mikrobiologicheskaya laboratoriya (zav. - starshiy nauchnyy sotrudnik M.G.Kuramshina), klinika kardiologii (zav. - dotsent N.M.Shikhova) i klinika aktivnogo revmatizma (zav. - prof. M.M.Shikhov) Sochinskogo instituta kurortologii.

DMITRIYEV, A.S.; TUSHNOVA, T.V.; SHIKHOVA, R.Ya.

Conditioned reflexes to time in children of different school age.
Nauch. dokl. vys. shkoly; biol. nauki no.4:77-84 '61. (MIRA 14:11)

1. Rekomendovana kafedroy fiziologii cheloveka i zivotnykh
Bashkirskogo gosudarstvennogo universiteta.
(CONDITIONED RESPONSE) (TIME PERCEPTION)
(CHILD STUDY)

DMITRIYEV, A.S.; SHIKHOVA, R.Ye.

Conditioned reflex changes in human pressure in response to temporary stimulus of muscular work. Nauch. dokl. vys. shkoly; biol. nauki
no.2:93-97 '61. (MIRA 14:5)

1. Rekomendovana kafedroy fiziologii cheloveka i zhivotnykh Bashkir-
skogo gosudarstvennogo universiteta im. 40-letiya Oktyabrya.
(BLOOD PRESSURE) (CONDITIONED RESPONSE)

PLAKSIN, I.N.; OKOLOVICH, A.M.; SUVORODSKAYA, N.A.; SHIKHOVA, V.V.

Xanthogenate behavior in aqueous solutions. Trudy Inst. gor. dela
4:234-240 '57. (MIRA 10:6)

1. Chlen-korrespondent Akademii nauk SSSR (for Plaksin).
(Xanthic acids)

PLAKSIN, I.N.; SUVOROVSKAYA, N.A.; SHIKHOVA, V.V.; VOSKRESENSKAYA, M.M.

Stability of certain collectors in acid media. Izv. vys. ucheb.
zav.; tsvet. met. no. 2:23-26 '58. (MIRA 11:8)

1. Moskovskiy institut tsvetnykh metallov i zolota i Moskovskiy
institut stali.
(Flotation)

18 (5)

AUTHORS:

Plaksin, I. N., Suvorovskaya, N. A., SOV/163-59-2-13/48
Shikhova, V. V.

TITLE:

Conditions for the Separation of Copper From Hydrometallurgical
Solutions (Usloviya vydeleniya medi iz gidrometallurgicheskikh
rastvorov)

PERIODICAL:

Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959,
Nr 2, pp 69-73 (USSR)

ABSTRACT:

Copper was separated from hydrometallurgical flotation solutions by electrolysis. The electrochemical operation scheme for the determination of the potential and the amperage of the electrolysis process are given in figure 1. The electrolysis container consists of plexiglass (Fig 2). Electrolytic copper was used as cathode and Armco iron as anode. The optimum concentrations of the main components (Cu, H_2SO_4) in the solution were detected. The influence of $CuSO_4$ on the electrolysis process is given in figure 3; the results are summarized in table 1. A considerably acid medium influences the electrolysis process negatively. The separation of copper from solutions with different sulphuric acid concentrations

Card 1/2

Conditions for the Separation of Copper From
Hydrometallurgical Solutions

SOV/163-59-2-13/48

and mixing rates was investigated and the results are given
in figure 4 and tables 3 and 4. There are 4 figures,
4 tables, and 3 Soviet references.

ASSOCIATION: Institut gornogo dela Akademii nauk SSSR (Mining Institute
of the Academy of Sciences, USSR)

SUBMITTED: July 17, 1958

Card 2/2

SUVOROVSKAYA, N.A. (Moskva); SHIKHOVA, V.V. (Moskva); SHMARINOVA, I.A. (Moskva)

Separating lithium from alkali and alkali earth metals by the ion
exchange method. Izv. AN SSSR. Met. i gor. delo no.5:98-100 S-0 '64.
(MIRA 18:1)

SHIKHOVA-NEGINSKAYA, V. V.

Application of very water-soluble foaming agents. I. N. Plaksin, A. M. Gerasimovich, E. L. Rankhryager, and V. V. Shikhova-Neginskaya. *Trudy Inst. Gornogo Dela, Akad. Nauk SSSR*, 1964, No. 1, p. 10. The use of DS, a Na alkyl sulfonate, in the flotation of Cu, Pb, and Zn ores. The Na alkyl sulfonate (DS) was proved feasible in the flotation of Cu, Pb, and Zn ores. The Na alkyl sulfonate has good foaming and collecting properties. The Na alkyl sulfonate (DS) showed good action with galena, chalcopyrite, and sphalerite, much less so with pyrite, and none with quartz, unless activated with CuSO_4 . The reagent was adversely affected by foreign ions, e.g., SO_4^{2-} , SO_3^{2-} , and Cl^- . The presence of pyrite decreased the recovery of other minerals. Weakly alk. conditions enhanced flotation of sulfide minerals. Up to 0.1% CaO had little effect, but above that it depressed the flotation of galena and pyrite. With DS as a collector and frothing agent in monomineral suspensions in weakly alk. medium, NaCN and ZnSO_4 depressed flotation of pyrite and, especially, of sphalerite, without affecting galena.

E. M. Babin

PG RM

CA SHIKHOVA-VOODOVOZOVA, M. V.

15

The solonetz complexes of the northern districts of the Voronezh region. M. V. Shikhova-Vodovozova. *Pochto-vedenie* (Pedology) 1950, 530-41. Analyses of aq. exts. of 3 solonetz samples are given. These analyses include alkyl in terms of bicarbonate, chloride, sulfate, Ca, Mg. The adsorbed Na on 3 soil samples is also reported. J. S. Joffe.

1951

SHIKHOVA-VODOVOZOVA, M. V.

Aspen

Ecology and genesis of aspen bushes. Biul. MOIP. Otd. biol. 57 No. 4, 1952.

Monthly List of Russian Accessions, Library of Congress. December 1952. Unclassified.

SHIKHOVISEV, M.M.; SHVETSOVA, M.V., inzh.

With the help of efficiency promoters. Bun.prom. 37 no.3:27
Mr '62. (MIRA 15:3)

1. Zamestitel' nachal'nika tsellyuloznogo proizvodstva Vtorogo
Kaliningradskogo tsellyulozno-bumazhnogo kombinata (for Shikhovtsev).
(Kaliningrad--Woodpulp industry--Equipment and supplies)

SHIKHOVTSEV, M.M., tekhnik

Circular equipment for digesters. Bum. prom. 36 no.10(20
0 '61. (MIRA 15:1)

1. Vtoroy Kaliningradskiy kombinat.
(Papermaking machinery)

SHIKHVARGER, B.L.

This has helped our collective to improve its work. Vest. sviazi
23 no.12:23-24 D '63. (MIRA 17:2)

1. Nachal'nik Yaroslavskoy telegrafno-telefonnoy stantsii.